

REMARKS

In this Response, Applicants amend claims 1 and 14. No new matter has been added. Support for the claim amendments can be found at least at page 19, line 9 to page 20, line 10 of the Specification and in Figure 4.

Claims 1-15 are currently pending, of which claims 1, 9 and 14 are independent. Applicants respectfully submit that all of the pending claims are in condition for allowance.

Claim Rejection under 35 U.S.C. § 103(a)

In the Office Action mailed January 6, 2009, claims 1-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2001/0044042 to Inoue et al. (hereafter “Inoue”) in view of U.S. Patent Publication No. 2003/0129475 to Enjoji et al. (hereafter “Enjoji”) and Japanese Patent Publication No. 2000-164230 to Sha et al. (hereafter “Sha”) (Office Action mailed January 6, 2009, page 3). Applicants respectfully traverse the 35 U.S.C. § 103(a) rejection of claims 1-15 for the reasons set forth below.

A. Claim 1

Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest at least the following features of independent claim 1: “at least one inlet buffer disposed on a first side of said coolant supply passage and at least another inlet buffer disposed on a second side of said coolant supply passage” and “at least one outlet buffer disposed on a first side of said coolant discharge passage and at least another outlet buffer disposed on a second side of said coolant discharge passage.”

As reproduced above, claim 1 requires at least one inlet buffer disposed on a first side of the coolant supply passage and at least another inlet buffer disposed on a second side of the coolant supply passage. Claim 1 also requires at least one outlet buffer disposed on a first side of the coolant discharge passage and at least another outlet buffer disposed on a second side of the coolant discharge passage. The above-recited configuration of the inlet and outlet buffers allows the claimed invention to achieve a uniform distribution of coolant to the flow grooves of the coolant flow field.

The Inoue reference discusses a sealant for sealing a solid polymer electrolyte membrane in a fuel cell (Inoue, title). The fuel cell includes an anode side diffusion electrode having an anode electrode and a first gas diffusion layer, and a cathode side diffusion electrode having a cathode electrode and a second gas diffusion layer (Inoue, paragraph [0013]). A pair of separators holds the membrane electrode assembly (Inoue, paragraph [0013]). A seal is provided onto the separators (Inoue, paragraph [0013]). The seal makes contact with at least one of the end faces of the first gas diffusion layer and the second gas diffusion layer (Inoue, paragraph [0013]).

However, the Inoue reference does not teach or suggest “at least one inlet buffer disposed on a first side of said coolant supply passage and at least another inlet buffer disposed on a second side of said coolant supply passage” and “at least one outlet buffer disposed on a first side of said coolant discharge passage and at least another outlet buffer disposed on a second side of said coolant discharge passage,” as recited in claim 1. The Inoue reference is silent with regard to inlet buffers or outlet buffers. The Examiner acknowledges that the Inoue reference does not teach or suggest inlet and outlet buffers for any of the fluid passages in the fuel cell (Office Action mailed January 6, 2009, page 4).

The addition of the Enjoji reference fails to cure the shortcomings of the Inoue reference in teaching or suggesting the above features of claim 1.

The Enjoji reference discusses first and second metal sheet separators provided in a fuel cell (Enjoji, abstract). The Enjoji reference discusses that the fuel gas passage, the oxygen-containing gas passage and the coolant passage are in the form of passage grooves defined in the surfaces of the separators (Enjoji, paragraph [0007]). The passage grooves extend from passage inlets to passage outlets (Enjoji, paragraph [0007]). The Enjoji reference mentions that a buffer area can be provided at the passage inlet or the passage outlet if the passage inlet or the passage outlet takes the form of small openings (Enjoji, paragraph [0008]).

However, the Enjoji reference does **not** teach or suggest “at least one inlet buffer disposed **on a first side** of said coolant supply passage and at least another inlet buffer disposed on **a second side** of said coolant supply passage” and “at least one outlet buffer disposed on **a first side** of said coolant discharge passage and at least another outlet buffer disposed on **a**

second side of said coolant discharge passage,” as recited in claim 1. Although the Enjoji reference generally mentions a buffer area provided around a passage inlet or a passage outlet, the Enjoji reference still does **not** teach or suggest two inlet buffers disposed on two sides of the coolant supply passage and two outlet buffers disposed on two sides of the coolant discharge passage, as required by claim 1.

The addition of the Sha reference also fails to cure the shortcomings of the Inoue and Enjoji references in teaching or suggesting the above features of claim 1.

The Sha reference discusses a conduction slot 10 (Sha, Figures 1 and 2 and related text). The conduction slot 10 includes an entrance-side conduction slot 11 which is disposed between a gas entrance 3 and flow grooves of the conduction slot 10 (Sha, Figures 1 and 2 and related text). The conduction slot 10 also includes an outlet-side conduction slot 12 which is disposed between the flow grooves of the conduction slot 10 and a gas outlet 2 (Sha, Figures 1 and 2 and related text). The conduction slot 10 further includes clinch slots 13a-d, each of which connects a first flow groove portion of the conduction slot to a second flow groove portion of the conduction slot (Sha, Figures 1 and 2 and related text).

The Sha reference discusses **a single** entrance-side conduction slot 11 connected to the gas entrance 3. More specifically, the Sha reference does not teach or suggest one inlet buffer disposed **at a first side** of the gas entrance 3 and another inlet buffer disposed **at a second side** of the gas entrance 3.

In addition, the Sha reference discusses **a single** outlet-side conduction slot 12 connected to the gas outlet 2. More specifically, the Sha reference does not teach or suggest one outlet buffer disposed **at a first side** of the gas outlet 2 and another outlet buffer disposed **at a second side** of the gas outlet 2.

As such, the Sha reference does not teach or suggest “at least one inlet buffer disposed on a first side of said coolant supply passage and at least another inlet buffer disposed on a second side of said coolant supply passage” and “at least one outlet buffer disposed on a first side of said coolant discharge passage and at least another outlet buffer disposed on a second side of said coolant discharge passage,” as recited in claim 1.

Because the Sha system includes a single entrance-side conduction slot 11 connected to the gas entrance 3, the gas is not evenly distributed to the flow grooves in the conduction slot 10. In contrast, the claimed invention is able to achieve a uniform distribution of coolant to the flow grooves of the coolant flow field by providing two inlet buffers disposed on two sides of the coolant supply passage, as recited in claim 1. The Sha reference does not motivate achieving uniform distribution of the gas to the flow grooves by using two inlet buffers disposed at two sides of the gas entrance 3.

For at least the reasons set forth above, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 1.

B. Claims 2-8

Claims 2-8 depend from independent claim 1 and, as such, include all of the features of claim 1. For at least the reasons set forth above in connection with claim 1, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claims 2-8. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claims 2-8.

C. Claim 9

Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest at least the following features of independent claim 9: “at least the number of grooves in a first inlet connection passage connecting said first inlet buffer to said coolant supply passage and the number of grooves in a second inlet connection passage connecting said second inlet buffer to said coolant supply passage are different” and “at least the number of grooves in a first outlet connection passage connecting said first outlet buffer to said coolant discharge passage and the number of grooves in a second outlet connection passage connecting said second outlet buffer to said coolant discharge passage are different.”

As described at page 6, lines 11-27, the above-recited configuration of the number of grooves in the inlet and outlet connection passages prevents the stagnation of the flow of the coolant due to the pressure equilibrium in the coolant flow field (Specification, page 6, lines 11-27). This allows the coolant to flow in the separator surface uniformly (Specification, page 6, lines 11-27). The system can thus achieve a desired flow rate and a desired flow condition of the coolant in the coolant flow field (Specification, page 6, lines 11-27).

The Inoue reference does not teach or suggest first and second inlet buffers or first and second outlet buffers, as recited in claim 9. The Inoue reference is silent with regard to inlet buffers or outlet buffers. The Examiner acknowledges that the Inoue reference does not teach or suggest inlet and outlet buffers for any of the fluid passages in the fuel cell (Office Action mailed January 6, 2009, page 4). As such, the Inoue reference does not teach or suggest “at least the number of grooves in a first inlet connection passage connecting said first inlet buffer to said coolant supply passage and the number of grooves in a second inlet connection passage connecting said second inlet buffer to said coolant supply passage are different” and “at least the number of grooves in a first outlet connection passage connecting said first outlet buffer to said coolant discharge passage and the number of grooves in a second outlet connection passage connecting said second outlet buffer to said coolant discharge passage are different,” as recited in claim 9.

The addition of the Enjoji reference fails to cure the shortcomings of the Inoue reference in teaching or suggesting the above features of claim 9.

The Enjoji reference does not teach or suggest first and second inlet buffers or first and second outlet buffers, as recited in claim 9. Although the Enjoji reference generally mentions a buffer area provided around a passage inlet or a passage outlet, the Enjoji reference still does not teach or suggest two or more inlet buffers separate from each other. In addition, the Enjoji reference does not teach or suggest two or more outlet buffers separate from each other. The Examiner acknowledges that the Enjoji reference does not teach or suggest buffers which are separate from each other (Office Action mailed January 6, 2009, page 4).

In addition, the Enjoji reference contains no teaching or suggestion on the number of grooves in connection passages connecting a buffer to a coolant supply or discharge passage.

More specifically, the Enjoji reference does not teach or suggest that the number of grooves in a first inlet connection passage connecting a first inlet buffer to a coolant supply passage is **different** from the number of grooves in a second inlet connection passage connecting a second inlet buffer to the coolant supply passage, as required by claim 9. Similarly, the Enjoji reference does not teach or suggest that the number of grooves in a first outlet connection passage connecting a first outlet buffer to a coolant discharge passage is **different** from the number of grooves in a second outlet connection passage connecting a second outlet buffer to the coolant discharge passage, as required by claim 9.

Furthermore, the Enjoji reference provides no motivation for the above-recited configuration of the number of grooves in the connection passages as recited in claim 9. For example, the Enjoji reference does not teach or suggest preventing stagnation of the coolant in the coolant flow field due to the pressure equilibrium in the coolant flow field. As such, the Enjoji reference cannot be combined with the Inoue and/or Sha references to teach or suggest “at least the number of grooves in a first inlet connection passage connecting said first inlet buffer to said coolant supply passage and the number of grooves in a second inlet connection passage connecting said second inlet buffer to said coolant supply passage are different” and “at least the number of grooves in a first outlet connection passage connecting said first outlet buffer to said coolant discharge passage and the number of grooves in a second outlet connection passage connecting said second outlet buffer to said coolant discharge passage are different,” as recited in claim 9.

The addition of the Sha reference fails to cure the shortcomings of the Inoue and Enjoji references in teaching or suggesting the above features of claim 9.

The Sha reference discusses a single connection passage connecting a single entrance-side conduction slot 11 to the gas entrance 3. In contrast, claim 9 requires a first inlet buffer with a first inlet connection passage connecting the first inlet buffer to the coolant supply passage and a second inlet buffer with a second inlet connection passage connecting the second inlet buffer to the coolant supply passage. The Sha reference is silent with regard to more than one inlet connection passage, each connecting a separate buffer to the gas entrance 3. As such,

the Sha reference does not teach or suggest “a second inlet connection passage connecting said second inlet buffer to said coolant supply passage,” as recited in claim 9.

In addition, the Sha reference discusses a single connection passage connecting a single outlet-side conduction slot 12 to the gas outlet 2. In contrast, claim 9 requires a first outlet buffer with a first outlet connection passage connecting the first outlet buffer to the coolant discharge passage and a second outlet buffer with a second outlet connection passage connecting the second outlet buffer to the coolant discharge passage. The Sha reference is silent with regard to more than one outlet connection passage, each connecting a separate buffer to the gas outlet 2. As such, the Sha reference does not teach or suggest “a second outlet connection passage connecting said second outlet buffer to said coolant discharge passage,” as recited in claim 9.

Furthermore, the Sha reference provides no motivation for the above-recited configuration of the number of grooves in the connection passages as recited in claim 9. For example, the Sha reference does not teach or suggest preventing stagnation of the coolant in the coolant flow field due to the pressure equilibrium in the coolant flow field. As such, the Sha reference cannot be combined with the Inoue and/or Enjoji references to teach or suggest “at least the number of grooves in a first inlet connection passage connecting said first inlet buffer to said coolant supply passage and the number of grooves in a second inlet connection passage connecting said second inlet buffer to said coolant supply passage are different” and “at least the number of grooves in a first outlet connection passage connecting said first outlet buffer to said coolant discharge passage and the number of grooves in a second outlet connection passage connecting said second outlet buffer to said coolant discharge passage are different,” as recited in claim 9.

For at least the reasons set forth above, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claim 9. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 9.

D. Claims 10-13

Claims 10-13 depend from independent claim 9 and, as such, include all of the features of claim 9. For at least the reasons set forth above in connection with claim 9, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claims 10-13. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claims 10-13.

E. Claim 14

Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest at least the following features of independent claim 14: “at least one inlet buffer disposed on a first side of said coolant supply passage and at least another inlet buffer disposed on a second side of said coolant supply passage” and “at least one outlet buffer disposed on a first side of said coolant discharge passage and at least another outlet buffer disposed on a second side of said coolant discharge passage”

For at least the reasons set forth above in connection with claim 1, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest the above feature of claim 14. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 14.

F. Claim 15

Claim 15 depends from independent claim 14 and, as such, includes all of the features of claim 14. For at least the reasons set forth above in connection with claim 14, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claim 15. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 15.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants believe that the pending application is in condition for allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact Applicants' attorney at (617) 227-7400.

Any fee due is authorized to be charged to our Deposit Account No. 12-0080, under Order No. TOW-108USRCE from which the undersigned is authorized to draw. If a requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. § 1.136(a) for an extension of time for as many months as are required to render this submission timely.

Dated: **June 5, 2009**

Respectfully submitted,

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